THE

COAL INDUSTRY

—OF—

VANCOUVER ISLAND,

—IN—

British Columbia, Canada.

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THE COAL INDUSTRY OF VANCOUVER ISLAND, BRITISH COLUMBIA.

[*Extracted from the *British Columbia Mining Record* of February and March, 1898.]

THE coal city of Nanaimo has long been known as the "Newcastle of the Pacific Coast," and it now aspires to be another Liverpool. Here coal is king. As an industrial, commercial and distributing centre Nanaimo yields to none, and the smelters, manufactories and works projected will doubtless sustain the ambitious claim. Aided by a short connecting line of rail to Gabriola (southeast end) the distance from the terminals of the Canadian Pacific Railway, can be abridged to almost an hour's passage by ferry. The cars that have been hauled for three thousand miles may thus be shunted to the merchant's door. Nanaimo, of course, claims a share of Klondyke trade—the coal steamers must have, and why not stores? This port is the final calling place in the province, on the northern voyage, and the first touched on the return. The advantages are obvious.

While the chief market for the famous Vancouver Island coal is in San Francisco and southern ports of California, the gradually enlarging provincial trade is a most important factor in the success of the industry. The prospects of a greatly increased local demand are the result of mining enterprises in this Island and province, and the outlook for securing the Klondyke trade.

THE FORMATION.

The avenue to the wealth of our coal beds was opened by the mighty uplifting force of the mountain upheavals, whereby large areas of the coal-bearing strata were raised from the "vasty deep" and tilted up, at various angles, so that after the glacial erosion, the rocky escarpments were left in view with seams of coal exposed, and these when discovered were mined from the daylight, down, until Dame Nature's obstacles cut off pursuit. And thereby hangs a tale, for just as in human life the good is mixed with ill, so the first beneficent rising of the giant mountain being all good, his after shaking and lateral push were evil of the direst kind, and many a "fault," "synclinal" and 'anti-clinal" crush, with "troughs" and "pockets" large and small, and total "wants," and troubles innumerable, are the coal operator's opprobria and inheritance, and the Island coal seams have their full share of these incommoding and expensive ills. Our coal barons deserve, at least, the meed of commendation, for their undaunted courage, perseverance and plucky determination, in combatting with the many difficult troubles and discouraging circumstances which they have shown in carrying on the industry underground in the face of reckless foreign competition, congested markets and tariff handicaps.

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*Published at Victoria, B.C., H. Mortimer Lamb, Managing Editor; London office, Leadenhall Building, London, E.C.

The explorations so far made on Vancouver Island have determined the existence of certain well-defined areas of the sandstone and conglomerate strata that indicate the existence of productive coal measures—of the cretaceous age--proved in some instances by the exposure of upper seams of coal, good enough, which though too thin for mining use, are favourable indications that workable coal beds will be reached at lower depths.

COAL AREAS.

The most valuable of these coal areas stretch along the eastern coast and at the northern end trend round to Quatsino on the west. Coal was first discovered on Beaver Harbour in the north in 1835, leading in course of time to the establishment by the Hudson's Bay Company of a coal mine at Fort Rupert. This field extends from Fort Rupert to Port McNeil, some fifteen miles to the south, and is known as the Suquash coal area and Malcolm Island has the same measures there. From the Suquash there is a valley that reaches Quatsino Sound, a very spacious inlet from the Pacific, branching into harbours and arms, leading to all points of the compass, and nearly severing the Island by Rupert Arm. On almost all these shores the cretaceous coal-bearing rocks are in view, mainly on Winter Harbour, (Forward Inlet) where good coal has been proved, of an extensive area; and again at Koprino Harbour. That the true measures are on Quatsino Sound, and at Suquash, the prospecting by boring and other research has shown. Not long ago the Fort McNeil Coal Mining Company proved the existence of a seam of coal, of fair thickness, in their bore-hole, and the surface indications there, as on the Sound, augur well for a northern field of bituminous coal of great extent and value.

Continuing southerly the east coast is barren, so far as coal is concerned, until after passing through Seymour Narrows, the coal measures recur near Campbell River, whence they run down the coast, embracing Denman and Hornby Islands—the Comox area—in which are the celebrated Union mines of the Union Colliery Company. Thence south through Qualicum, Englishman River, Nanoose, Wellington, Nanaimo, Gabriola, Cedar and Oyster Districts—with Wellington mine extension south of Mount Benson. In these localities there are fields of bituminous coal of large area and productiveness. At Chemainus is a break until Macpherson's, where there is a promising area that will repay investigation.

The chain of islands running from Gabriola to Saturna and Tumbo are coal-bearing with indefinite continuations beneath the Straits.

On the large Island of Salt Spring the coal measures appear, and there as well as in East Saanich and on adjoining isles coal will yet be found of good commercial value.

From Quatsino Sound, southwards, on the west coast, the characteristics which denote the presence of coal-bearing strata appear occasionally along the shore—very good prospects are said to exist at Hesquiot Harbour—until the cretaceous rocks are overlapped by the tertiary on the coast of Fuca Straits. Otherwise, in many places the rocks are highly mineralized, the metamorphic rocks are seen, and for long stretches there are only gneissose rocks, crystalline limestone and porphyry. These realms will well repay the adventure of the prospector. Of the *terra incognita* inland of Vancouver Island it may be predicted that some of the many valleys between the mountains will, in due time, prove to be coal-bearing of the same cretaceous horizon. A drawback to exploration for minerals of any kind, is the mass of vegetation growing everywhere round the lakes and on the river banks, preventing thorough search and concealing all but exposed sections.

AN OLD ESTABLISHED COMPANY.

Of the established coal mining industries the oldest now in operation is that of the New Vancouver Coal Mining and Land Company, Limited, an English joint stock corporation, whose original charter dates from 1862. Its business has been conducted on so large a scale that during its existence of thirty-five years it is probable that the cash circulated by the company, for wages, services, machinery and supplies will foot up to as many millions. A vast concern—an honourable career.

The central works and principal shaft, or pit, of the Nanaimo Colliery, are in the precincts of the city of Nanaimo, where also the offices of the company are situated and all operations of the busy industry are carried out under the immediate supervision and direction of the company's well-known and popular Superintendent, Mr. Samuel M. Robins, J.P. The other colliery works and pits are at distances (miles apart) in the north, south and east coal fields of the company's broad estate of many thousand acres. Railroads of standard gauge connect these works and pits with shipping wharves. The company's lines of railway also have sidings and connections with the Esquimalt & Nanaimo Railway for freight and other uses when required.

A description of the central pit, called the No. 1 shaft, on Esplanade, will afford a fair idea of what the rest are like.

A VISIT TO THE WORKS.

Taking the reader on an imaginary visit to the works, and having obtained from the genial manager, Mr. William McGregor, full leave to view I first seek the pit and there find, not one, but two shafts, as by law required. No. 1 circular in form, eighteen feet in diameter is bricked where needed for safety by huge wedge-shaped blocks. The No. 2 shaft is all alike, but two feet less in diameter, is sunk about 200 feet to the north of the No. 1, and sealed air-tight; it communicates with the ventilating fan by an underground passage through which the fan exhausts the noxious powder smoke, foul air and gases from the mine. Above the air shaft is placed, all ready for an emergency, a pit head frame with pulley, and at hand a winding engine with drum, and cable wound so that by removing part of the pit cover this means of rescue could be put in action in ten minutes and raise all men from the mine in case the other pit be blocked. A visit to the engine room of the fan house reveals the ponderous machine ever in motion, whirling round the enormous wheel thirty-six feet in diameter and twelve feet wide, that, with its air-sweeps, constitutes the fan, which, at forty revolutions, causes a current of air to circulate through the twenty miles of roads, ways and working places in the depths below of a volume of 150,000 cubic feet per minute. The wheel (fan) is encased in a special chamber (which looks like an odd addition to the engine room) and the impure air is forced up a conductor, where its heat causes it to ascend to heights above. This monster ventilating apparatus, known as the Guibal Fan, is an achievement of modern mechanical skill—the very shaft on which the wheel revolves is in its taper and make—to avoid the slightest tendency to warping—a model of skilful adaptation. Black, Hawthorn & Co., of Gateshead-on-Tyne, Eng., are the makers of the Guibal fan, which is doing such excellent work. The great cost of installing this fan in the first instance is outweighed by the complete security it yields from the insidious enemies of mining—the gaseous emanations, weak and foul air, the causes of many a calamity and great destruction of life in the past history of coal mining. But no earthly good without its attendant drawback, which in the use of the fan system of ventilation, is that the "breeze of wind" passing along the working wayse dries all accumulated dust, and should a blown-out shot of an isolated explosion occur, the almost imponderable dust is diffused so as to make it a dangerous, inflammable and explosive mixture. This contingency is provided against, so far as possible, by sprinkling water in the dry and dusty districts of the mine. Besides the large fan is another on the Murphy plan for use in case of emergency. In an adjoining building is the engine for this auxiliary fan and also an air compressor, going night and day supplying power for small pumps and hoisting gear in dipping places below.

On the way to the No. 1 shaft is a forest of prop-wood of all sizes and lengths, and there are piles of lagging for timbering the mines. rolls of Hessians (canvas) prepared with tar, for curtains, to divide and turn the air, food for mules; and these with the numerous supplies used daily in working the mine, are loaded on cars and put on the cages at the surface landing of the shaft in the intervals of hoisting runs of coal. By ascending a flight of steps the pit-head of No. 1, about twenty-five feet above the ground, is reached. This pit-head or bank, is built of heavy balks of fir, 16x16, set crosswise, so as not to obstruct the flow of air and yet sustain the weight and pressure of the pit-head winding frame and gear which rises to a height of fifty feet above the platform of the bank. The pit-head is well housed, and is a snug refuge from the winter's storm. The cages are kept from swaying, by four-corner guides of wire rope stretched taut and up and down these ropes they slide—the guides use up a mile of rope. The banksmen receive the cage as it comes from the pit, and, with the celerity of continuous practice, withdraw the laden cars, replace with empties and dispatch the cage at once for more. The full cars are weighed, sent to the "tippler," and turned over into the railway waggons. In passing over the screens the dross and smaller lumps are separated from the lump coal by the shaking of a steam jigger and thus the coal is double screened and cleaned for shipment. The operations are so rapid and almost automatic, that it takes a sharp eye to follow them. At the weighman's office the numbered tag is removed from the car, the weight marked down on the output sheet, and tag hung up, so that when the miner comes off his shift, he receives his tags and notes his daily gain. At the month's end a summary of the daily output is spread on the outside of the weigh house for the use of all. Here, also, are posted the reports of the miners' own examiners on the state and condition of the mine, as to safety and freedom from gas. The pit mouth and the surface landing are guarded by fences or lifting gates raised and lowered by the cages, and thus the unwary are protected. The chutes for townsmen's use and reception of refuse rock and dirt, and the manure from the stables below, are in constant use. The crippled mine cars are switched off to a repair shop, where they are refitted with wheels, mended and strengthened over all, until, when past all carpentry, they too increase the dump. The heap of broken wheels shows the stress laid on these cars. While on the tippler, in a twinkling, the wheels are oiled before the return below. From the pit's mouth to the coal is 650 feet, with a sump for water lower down. The mine is relieved of the water that accumulates beyond the capacity of the sump and a lodgment by a Cameron pump of twenty-eight-inch cylinder and four-foot stroke which forces up the water to the surface in a four-inch column. Water is not a trouble here. Leaving the busy weighman, who is

Nanaimo City's Auditor, I seek the motive power of this great work. Close at hand the giant lives in the engine room of a finely appointed house. The engine driver has his hand on the lever and his eye on the indicator, showing the different heights of the cage in the shaft. Looking round I see the fireman's record book—and being open, read—'tis for the information of all concerned, and I am on next morning shift. "Bar. 30.2. Examined all the working places and found all safe. James Price." "Bar. 30.4 at 2 p.m. Examined all the working places at 2 p.m. and found all clear. M. Harris." These readings of the barometer are recorded by the fireman at each shift (thrice a day) from an instrument standing in the engine room, and the report of safety is made to the officer in charge of the mine before a man can travel to his place. Four telephones decorate the ante-chamber. All branches of the works, pits and wharves have telephone connection, and with the Superintendent's office.

The powerful winding engines rest so solidly and evenly on their massive bedding that though going at tremendous pressure, and with all the force of their 500-horse power, the movement of the connecting rods, plunging away with an oily ease, causes not the least vibration. At each fresh start the immense drum over forty feet in circumference round which the steel cables coil and uncoil, speeds round so rapidly as to cause a pleasant zephyr in the heated room, and the cables to which the cages are appended, seem to leap to the top of the lofty shaft frame and to drop over the pulleys vertically into the shaft. The swift movement of the engines, and the gliding of the cables, that can lift six tons at the rate of thirty feet a second, is fascinating and leaves an impression not soon effaced. The signal, a steel spring, moved by a lever pulled from the pit's bottom by a wire rope, and falling on a gong, keeps incessantly striking, for lowering or lifting the coal-laden cages, and at times a precious human freight, which is done with seemly care. The engines are of an improved modern type for winding; they are built by Oliver, of Chesterfield

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The New Vancouver Coal Company's shipping wharves at Nanaimo, although not completed to the point of mechanical power and efficiency, which it is the present aim and intention of Mr. S. M. Robins, the superintendent of the Company, to shortly accomplish, are nearly, if not quite, equal to the extraordinary requirements of the rushing commerce of modern times, as shown by the lightning dispatch given to the mammoth steam collier "Titania" on her last call at the port of Nanaimo. The steamer arrived at 11:30 a.m. and was under the new twin shutes at 11:55, from which coal was poured into the capacious hold at the rate of 750 tons an hour for six hours, and then only the necessity for trimming began, with its attendant hauling of the immense vessel fore and aft to accommodate the proper trim and stowage in the hold. But at midnight (12:25 a.m.) the cargo and fuel, amounting to nearly 6,000 tons of Nanaimo coal, was placed on board. The "Titania" took her departure at 1:15 a.m,, and by 5 p.m., all going well, was away past Cape Flattery. in the Pacific Ocean; on her voyage to the Golden Gate of San Francisco.

Mr. Robins personally superintended the dispatch of the loading, and, with the exception of meal times, and the incidents of small hindrances, such as cars jumping the tracks, etc., stopping hauling, and the dropping of the steamer's steel rope into the water, causing her to sway off the wharf and lose time in recovering her position, the work was carried on continuously and finished without any accident.

The new bunkers at the loading wharves, with the bins, store nearly 10,000 tons of coal ready for immediate shipment, and the two powerful locomotives assigned to the task of hauling up the grades of one foot in fifty, took their loads of 100 tons each up to the loading staiths with comparative ease and speed. Trains, each of twenty empty cars, were ready for the return trips. And so it wenton all the twelve hours; while the bunkers yet hold a cargo for the steam collier "Burma" soon due at Nanaimo.

The New Vancouver Coal Company is to be congratulated upon having the operations of the colliery brought up to so high a pitch of efficiency, and certainly in the matter of loading, to the record point on this continent, while a further reduction of two or three hours in time is promised and looked for. *Finis coronat opus.*

in England, are of high pressure, direct acting, with thirty-inch cylinders, have Cornish valves, and move with a sixty-inch stroke, working generally under seventy pounds of steam. The hoisting cables are of the best crucible steel wire made—over a quarter of a mile in length is used. The cables are inspected daily. An enormous cog-wheel is provided for attachment and working pumps of thirteen-inch column if ever the aid of such a power should be required. The hoisting capacity of the engines is 3,000 tons a day. The steam service for all the engines above and the pumps and engines below necessarily demands an extensive range of boilers, and the boiler house with its high brick stack is furnished with boilers of the old type, and four Lancaster double-flue boilers, four feet by twenty-five feet, are supplied by a heating feeder; their furnaces are ever glowing, and the smokestacks belch forth black clouds of smoke—the sign of industry. The handsome power house is next in view, and here a Ball engine of 150 horse power exerts a powerful dynamo that generates the electric force to drive the three forty-ton motors used in the levels for hauling distances of upwards of two miles from the pit bottom, and also for supplying light where its use can be applied above and below. Attention is drawn to the so-called "Pullman cars" for conveying miners to the No. 5 shaft, some miles towards Nanaimo River, in the south coal field. A closer look evokes a smile; while the rubber springs are there, yet all is rough and bare, but safe has been the transit for years past—no accident has happened, no life endangered or limb hurt, in the many miles they've run. Near by the office is the goods depot, where "everything" required is kept in store and issued on order from the proper source. The powder magazines are situated about two miles on the No. 5 railway and issues are made in kegs at appointed times.

The "stables" and their grounds are a department by themselves, and with their noble horses and well-kept rolling plant are an indispensable provision for transferring supplies for uses of the mine, and the periodic housing and treatment of the force of mules which trundle the coal cars in the dark roadways below. For want of room in the stables of No. 1 shaft some of the mules are now brought up and enjoy their shelter and rest above. The hauling of the large quantities of lumber and pit wood and the delivery of all kinds of goods, provender and machinery to various works and different parts of the company's estate makes a service of horses and waggons a needful requisite. The animals and plant on view at the stables will satisfy even an exacting connoisseur. Then the company have a farm, of which more anon. Jumping on the locomotive "San Francisco"—by leave of the demure driver—I take a "run" of thirty coal-laden railway hopper waggons for shipment and learn that each waggon carries from five to six tons of coal and the waggons, after passing over the scales are emptied down the chutes into a vessel's hold. Stopping at the wharf weigh-house I alight and observe the detail and care with which each waggon is weighed, its number, and tare weight (painted on its side) gross weight and nett, recorded. Four double tracks lead to staiths, with chutes that serve the tide levels, or, the waggons may be shunted overhead of the capacious panelled bunkers where nearly 4,000 tons of coal can be stored, ready for shipment, in short order. On both sides of the bunkers are railway tracks, and thirty chutes discharge coal from the bunkers into waggons laid in train. The company's shipping wharves embrace a frontage of upwards of 2,000 feet, and, there are besides, roomy wharves with hopper receivers into which ships unlade their ballast, consisting generally of rock, sand or earth. It is interesting to note the various kinds and sources of the addition formed to the *terra firma* of Nanaimo, by the ballast, which for nearly half a century, has been dumped on its shores. By enquiry I ascertained that, within a radius of half a mile, there were contributions of lava from Hawaii, sand from Japan, shingle from the beaches of Alaska and Siberia, a large portion of Telegraph Hill, San Francisco, and shiploads from most of the countries bordering upon the Pacific Ocean. I follow up the "run" of waggons and see the simple and expeditious method used for discharging the waggons directly into the hold of the fine steamer *Peter Jebsen*, under charter for San Diego in Southern California—the full cargo of nearly 5,000 tons (including fuel) was placed on board in the short space of twenty-eight hours. Lying at the wharf was also the noble specimen of collier steamer *San Mateo*, waiting her turn to take up a cargo of 4,500 tons for San Francisco, while in the offing, and at the ballast wharf, were several sailing vessels, part of the fleet engaged in the coal trade. Near at hand, at her own landing place, is the company's steamer *Mermaid*, used for towing and shifting vessels and barges, and ready, at a moment's notice to steam to Victoria or across the Straits to Vancouver, or to proceed up the Fraser River, as the case may be. Looking again at the loading of the steamer it appears to be carried on as rapidly as possible—no waits between waggons. As fast as one is discharged and switched off, to join a train of empties, another waggon is sent to the chute, down which the coal runs in a stream, and yet, by an adjustment of the chute, much breakage is obviated. At suitable distances off the wharves, are large mooring buoys belonging to the company; they are held in position by heavy cables and anchors. To these, vessels can moor and swing off and on to the wharf, as may be needed. The water at these wharves, (as at all the wharves of the company on other parts of their estate) is deep enough to accommodate the largest vessels likely to frequent these seas. The Dominion Government dredger has been doing great service during the past six months right in front of the wharves, and along the north and south channels of approach there is a minimum depth of thirty feet at low tide, and the dredger is still at work.

Mr. Robins, the Superintendent, with a view to further expediting the loading and dispatch of vessels resorting to the company's wharves, is having an elevated railway laid upon substantial trestles constructed so as to gain a height of about forty feet above high water, and about forty feet distant from the seaward staith. Here a new shipping staith with a set of chutes to serve all stages of the tide will be erected almost immediately, as a large force of men has been recently engaged to carry out the work, and the completion of this extensive structure will enable the loading of coal into two hatches of the large freighting steamers at the same time, and will also admit of two gangs of coal "trimmers" working, where now, only one can be usefullly engaged at trimming in the ship's hold. The Nanaimo *Free Press* of March 2, 1898, states: "The first vessel to load at the enlarged dock of the New Vancouver Coal Company was the steamer *Burma,* which yesterday evening completed her cargo of 4,600 tons of coal. The *Burma* arrived at 7 o'clock on Monday evening, and at five o'clock last evening had completed her cargo in the reduced time of twenty-two hours. The best previous record had been twenty-eight hours. It is stated that as soon as all the contemplated improvements are completed, the time of loading will be reduced to twelve, if not ten hours."

After about 1,500 tons, more or less, according to the size of the vessel, has been put on board, it is necessary to trim, or shovel, the coal that is subsequently put on board, into spaces of the hold, where it will not find its way by gravity, and this service is performed by a body of stevedores who are hired and paid by the hour a liberal wage for an exceedingly laborious task--these men have formed themselves into a "union" which has hitherto worked satisfactorily, and the rapid trimming of vessels at the company's wharves has long gone on without a hitch, which is so far creditable to their "unionism." *Apropos* of union organization, the workmen in the employ of the New Vancouver Coal Mining and Land Company, Limited, are organized and regulated according ing to trade union principles—the miners and mine labourers have their "Protective Association" and the artizans have their "Club," and for years no serious disagreement has occurred between the company, as represented by Mr. Robins, and the large number of employees under his governance, nor is there any symptom of future difficulty likely to disturb the harmony now existing between the representatives of capital and labour in this extensive business, under the present successful management. Besides the bunkers mentioned there are spacious platforms from which filling into waggons is done, and, during the lull in the arriving of vessels, coal is piled on these platforms in heaps of thousands of tons, called "bins" so that when the bunkers, bins and the 250 railway waggons are full, there is a stock of coal of about 7,000 tons available for immediate shipment at No. 1 shaft shipping wharves. To provide waggons to hold that quantity would involve an outlay of $350,000 at least for 12,000 waggons, and as such an outlay would be out of the question the bunkers and bins and the labour of re-loading, costly as this system is yet, proves to be the more economical means of dealing with this branch of the industry. The company have in contemplation the erection of other bunkers of like storage capacity with these now in use, and also intend to build additional railway tracks and loading staiths further to seaward, involving an extension of their wharves by some hundreds of feet in length, and these projected works will give employment to many workmen. The steam driver is already driving piles and preparing for action.

The company owns five locomotives; among them are modern engines weighing up to forty tons, and these fine engines, with the hopper railway waggons, many flat cars, and ballasting cars, form a good array of rolling stock. The locomotive round-house is a pretentious building with all adjuncts for repairing, cleaning and keeping the engines in thoroughly going order—the style of its arched windows and their length are suggestive of the old-fashioned chapels or places of worship to be found in remote Old Country towns and villages.

Entering the machine and smithing department—both branches provided with commodious "shops"—we find a busy staff of mechanics, fitting, turning, filing, cutting and punching all sorts of iron, steel and brass work. The shops are completely fitted up with modern labour-saving machinery—some of the lathes are very powerful. There are steam shears and punchers, drill presses, pipe and screw cutters, an hydraulic press of great power, planers, a massive steam hammer, steam blowers, huge cranes, etc., etc., equal to all general requirements of the colliery. Conspicuous among the iron working machinery in constant use are machines bearing the name "Bertram & Sons, Dundas, Ont.," which leading firm is represented in this province by the Wm. Hamilton Manufacturing Company, London, who have a branch office at Vancouver, B.C. There are six forges in the smiths' shop in charge of men of brawny arm and skilful touch, who handle and execute very heavy forgings, as well as the finer work demanded by the machinists. The wear and tear of machinery and rolling stock in constant use demands of course a large expenditure, materially enhancing the cost of coal production, and consumers are apt to lose sight of these and the other heavy costs wherewith the industry is taxed, when inveighing against reasonable prices charged for the product delivered at their doors.

Near by are the carpenters' shops, for construction, reinstatement and repair of railway waggons and cars—no inconsiderable item—and for the other apparatus and fittings used in and about the mine, and the company's farm. The shop is furnished with steam sawing, planing, edging and other wood-working machinery.

The members of the brass and reed band, composed of colliery workers, are allowed by the kind permission of Mr. Robins to use a room in the upper story of the waggon shop for practising. The Nanaimo Silver Cornet Band has recently been supplied with new instruments, and is said to be quite proficient, and able to hold its own with any band in the province. Nanaimoites are justly proud of the colliery band. All the workshops and buildings are lit with gas, and the tracks, etc., with electric light—arc system. Retracing my steps towards the wharf, I observe numerous pieces of machinery, duplicates of important parts, sets of locomotive wheels and axles, pit cages, ventilating fans, spare shafts, pumps from hand sizes to the most powerful steam makes, hoisting trunks or enormous iron buckets, tanks, etc., etc., kept in reserve to meet emergencies that may arise at any moment in the pursuit of the hazardous undertaking of coal mining on a large scale. We are struck with an old apparently discarded, engine, that is evidently of primitive design—a massive iron pillar with its "walking beam" that had earned a rest, after raising hundreds of thousands of tons of coal, and millions of gallons of water, from the old Douglas pit in the halcyon days of yore—it bore the historic name of "Bolton & Watt" as makers. In the space underneath the bunkers, utilized for storage purposes of heavy supplies in reserve, are many miles of piping of all calibres, and other heavy iron goods. Alongside the track, among the dog rose bushes, are the remains of an old-fashioned staith windlass, dispensed with nearly forty years ago, but looking as strong and defiant of Time's ravages now as when first hewn out of the tough wood, and forged, cog-wheels and all, out of heavy bar iron in times gone by, but now cast aside to make room for the modern. *Sic transit gloria mundi,* one feels inclined to murmur regretfully. Anchored in a small inlet is one of the smartest steam launches on this coast; its lines are perfect and promise speed. The graceful little craft is appropriately named the *Swan.* The launch is useful where speedy communication is urgent, and for reaching the surrounding islands where the company owns coal properties; she has also done good work in towing scows, etc., in the absence of the *Mermaid.*

From the wharf a fine view of Protection Island is obtained, and the lofty pit-head frame, gigantic wharf staiths, bunkers and colliery buildings of the Protection Island shaft tower above the tall pines in the background. It is, however, difficult to realize that those works are connected by sub-marine roads with the No. 1 shaft, as well as with the workings extending under Newcastle Island and beneath the harbour generally.

Evening is coming on, and by the sounding of the five o'clock steam horns of the workshops and pits, I learn the day's toil is over. Among the workmen returning to the town are several showing the signs of advancing age—not a few of the employees have been in the service for thirty years, and many for twenty years. It is not to be wondered at that a strong feeling of loyalty exists towards the management. The hours of labour of the artizans and outsiders are from 7 a.m. to 5 p.m., an hour being allowed at noon for dinner, and on Saturdays work finishes at 1 p.m.

Tired with the day's ramble round the works, and in prospect of an early rising to go down the pit on the morrow I gladly seek rest at one of the several well appointed hotels of Nanaimo, and with a feeling akin to that of one about to enter upon some desperate adventure retire to sleep, leaving strict orders to be called early on the morrow. The pit horns had given a long sounding blast at 9 a.m., signifying that there would be "work all round" next day.

DOWN NO. 1 PIT.

Early, very early, at 4.30 a.m., the first "miners' call" of three unearthly and long drawn soundings of the pit horn disturbed me from a blissful slumber. At five two more blasts, and after despatching a bowl of porridge, I hurry off. I arrive at the works, just as the half-past five single toot rings out, to see a crowd of workmen get on their train and leave for No. 5 pit. The men on the morning shift for No. 1 come trooping along and soon the pit-head is crowded with sinewy men equipped with lunch buckets, tea cans, and powder cans, and these with a lamp-crowned cap, complete the miner's outfit, his sharpened tools—picks and auger drills—having been sent previously to the pit's bottom. Mule drivers have their stout whips around their necks. All have white faces and clean clothes for the nonce. At six o'clock precisely, Mr. Archibald McGregor, the weigh-master, arrives, and signals are sounded by the gongs, from top to bottom, and to the engine room, when all being well and ready, the cables move and down plunges the topmost cage. In about thirty seconds a cage of men of the night shift emerges from the depths. As they come off a fireman with thirteen or fourteen men file in behind, filling the cage, and, holding by a bar overhead, down they go and another cageful of humanity arrive with blackened faces and bespattered clothes and lamps still alight—the descending shift have no lights, owing to the powder carried down. Boxes of tools are despatched and in about ten minutes the shift has changed. The conduct of the men is characterized by perfect discipline and order—there is a total absence of jostling or noisy talk. At the invitation of the manager, Mr. William McGregor, and provided with a lamp and necessary etceteras, I take my place on a cage (there being but one deck I am able to stand upright), and holding the bar as we drop through the darkness for 650 feet, reaching the bottom before we have really realized our position. The landing, a very spacious place, blazes with incandescent lamps—a veritable magician's cave. But if ever there was a place of business it is at the foot as well as in the workings of a coal pit. The hours of life below are short—in all eight hours, out of which the lunch time is taken, and in many cases it occupies quite an hour to go to and return from the working places, leaving only some six hours and a half of work. Men who are paid merely for the actual coal mined and filled by them into cars, cannot waste a minute of the precious time, so limited, at their disposal, and their results press on the heels of the pushers, hauliers, brattice men and those working by the shift, so that all must be going at a lively pace or a deadlock will soon ensue. There is, therefore, no opportunity for gossip, and, as, once away from the electric light, all is black as Walpurgis night, although I follow my guide with implicit confidence, yet there is nothing to see, and only when attention is directed to some point of difficulty that had been met with in the development of the mine, such as an up-throw, or down-throw, or a pinch out, or horse back, etc., and an explanation is given of how it was overcome or got round, is the monotony varied. Whoever proposes to go down a coal pit for the fun of the thing may save themselves much unnecessary toil and do the thing at home, for if they happen to have a damp, low-roofed coal cellar, they can evolve as much "fun" by groping about, over their own coal, as it is possible to find in an exploratory tour of a coal pit. A knock on the head every now and then from projections in the roof of a low, short, cut, along which one is trying to make headway, by the feeble lamp glimmer, with one's back almost at right angles to one's legs, is trying to say the least, and I remember with a pang that if I had been with the workmen I could have boarded the train of empty cars, which conveyed them so comfortably along the No. 1 north level to their work. The electric motors traverse this level for a distance of about two and a half miles from the pit to a long heading known as Boyce's Incline (named after Tully Boyce—for it is usual to give the name of the leading contractor to a gangway which his party has put through.) When carrying men the motor only runs at about five or six miles an hour, but on returning with from forty to sixty laden cars, each containing from thirteen to fifteen hundredweight of coal, it travels at a very much greater speed. There is a meeting place and sidings where the motors going in opposite directions can pass (very much as they have on street car lines). The system has been in use for several years and no mishaps of any consequence have occurred, which is a very excellent record. Mr. H. F. Bulman, of England, was recently conducted through the mine; he was much interested in and closely examined this system of underground hauling by electric motors, and declared his unqualified approval of the mode of construction and operation adopted, adding that there was nothing of the kind as yet in all England. There they still adhere to endless rope and tail rope systems. Mr. Bulman is one of the authors (with R. A. S. Redmayer) of a treatise just published, by Crosby, Lockwood & Son, 7 Stationer's Hall Court, London, on the Colliery Working and Management of Mines.

The levels, inclines and slopes are from ten to twelve feet wide, with an average height of six and a half feet, are substantially timbered where needed, and are flanked by solid pillars of coal of as many as forty yards in width which form a grand support to the superincumbent mass, measuring at some points 600 and in others 1,800 feet to the surface. The inclines, levels and slopes are the great highways and with the airways driven alongside them form the lungs of the mine; similar wide pillars also bound the airways or counter levels, and behind the pillars roadways are driven, off which the miners open up stalls or rooms, out of which the coal is mined. In this pit the system of working is called the "panel and stall." The panels are limited areas of the seam which are sub-divided into pillars and stalls which are worked from twenty-five yards centres, and when the stall is worked to the end of its limit or panel varying from 200 to 350 yards in length, there remain in the mine solid coal pillars of fifteen yards in width on each side of the empty space (or worked-out stalls) and the result, generally is that from three-fifths to two-thirds of the original coal seam is left standing in the mine awaiting the time when the extreme limitations of operations of the pit have been reached, and the order is given to draw the pillars, the execution of which commences at the farthest distance from the pit (to the "rise" or "dip" of the seam according to circumstances), the pillars are withdrawn, letting the roof come down behind, so that the life of a pit is a long and lingering one, and many years elapse before an extensive one is worked out. The "levels," while they are graded systematically, follow the contour of the seam transversely, as we would grade a road round a hill side, and therefore the levels are not straight. The workings off the main levels are separated by means of the inclines and slopes of the seam, which are driven in right lines, some inclines running up from 1,000 to 1,500 yards. The coal is brought from the stalls to the inclines in cars by mules wherever they can be worked, and otherwise by the pushers, who have also to keep the miners supplied with empty cars. The cars are let down the inclines by rope drums regulated by brakes, the full cars descending by their own gravity, the empties being drawn up at the same time, the track generally being double. At the foot of the inclines the cars are taken away by the motors, in return for empties brought in. I am now alluding to what is called down the mine the inside levels in distinction to the main slope, to be shortly noticed.

THE MINE VENTILATION.

The ventilation is upon what is known as the separate split system and the mine is divided into districts entirely independent of each other. The fresh air is taken in from the Protection Island shaft which is connected with the workings of No. 1 shaft, and if necessary all the miners could be hoisted up to the Island. As to fresh air, I have enjoyed good air all the time of my stav and have even felt cold and as if in a draught now and then, although the natural temperature of the mine is—according to depth—several degrees warmer than at the surface. After having noticed the self-acting inclines, heard the rumble, and seen the rush past of the mule trains, I enter several of the stalls, and here there is a—well, a pit(iful) smell, arising from powder smoke and from the fish oil used in the lamps, as well as from the oily stuff with which the car wheels are lubricated; there is also dust in the air—coal dust—and I become aware that I am gradually becoming what is known as "blackened up". The air is conducted into the "stalls" (often called "rooms") and a miner is as attached to his stall, as many a lady is to her drawing room. All the miner wants is a good face of coal and fair wages, and in this pit he appears to have both at command, and fair play as well. Pure air is continually passing from the brattice or partition which leads the air as near the face is it is possible and at the same time avoid the breakage of the partition (formed of inch rough lumber) by coal blown out by "shots." The miners seem happy enough at their work, and I could not help noticing the immense size and weight of the lumps of coal which the miners by some knack and mode of bringing thighs to the assistance of arms, managed to lift and place in the cars. Surely, is gravity more easily overcome in the depths of the mine than on the surface?—or is it the knowing how and having the strength to do it?

Besides the overman—Mr. Joseph Randle, Jr.—who appeared to be here, there and everywhere all through the mine, and must travel many miles in the course of his duty, there are shotlighters, who examine the position and loading of the holes which the miners purpose firing and, on approaching, pass them, then firing can take place, in safety. This is a necessary safeguard against "blown out shots" which send many yards of flame out among the unavoidable deposits of coal dust, and possibly deal out death and destruction around. The firemen are also continually busy on their rounds examining for gas (they follow up the work of the firemen of preceding shifts) and test every place where it is likely to accumulate; they also watch the ventilation of the mine. The "boss" pusher is also an important personage in effecting the output. While "lunch" is on, the powder smoke has time to clear out of the stalls, and I leave the "inside" (of the great fault) and in due course return to the pit bottom.

Later I am taken to see what is generally the first "sight" shown below,—the stables. To the south of the pit, in the No. 1 south level is an excavated chamber, forming comfortable stabling quarters for about fifty mules, half of which are on the inside, miles away, hauling cars to the inclines—they are trotted along the No. 1 level from which the electric current had been cut off, before the descent of the morning shift, and the coming home of these animals and the shutting off of the electric current to enable them to traverse the level means that the men must find their way out on foot, but they make use of short cuts and so the journey is not so long. Of course the animals that are now eating so contentedly will go to relieve their brethren so as to be on hand before the afternoon shift come down at two o'clock. Nothing is wanting to make the underground life of the poor beasts as tolerable as possible. They have the best of fodder, not omitting the succulent roots produced on "the farm," and Chase River water is brought in pipes down the pit, in abundance. The bedding is of peaty soil from spots on the company's estate, sent down for the purpose, which, after use, goes up with the manure to fertilize the farm. Mules working in places off the main slope, are lodged in the "stables" on the surface. The mule drivers' and stablemen's lives may not be thought by them to be very happy ones, but one cannot help feeling that the mules themselves have a good enough time.

Proceeding to the well lighted landing, and observing the dispatch of cars made by the "cagers," who standing in a perpetual downpour of air from above, damp and cold in temperature, as it were in a constant draught, yet have positively no time to "catch cold," from mere press of work, for the cars come and go without any respite. The cager's job is not a sinecure. In the engine room near the head of the main slope is a fine winding engine, of sixteen inches cylinder, thirty-six inch stroke, and five-foot drum, which hoists cars from the slope. The steam comes down the No. 2 shaft, into which the exhaust is conducted. The main slope has been driven for upwards of 6,600 feet in an easterly direction—at the face the depth below the surface datum level is about 1,450 feet. On both sides of this long slope counter slopes are driven as far down as 2,400 feet, and from thence a counter on one side. Off the slope are levels running north and south, numbered from 1 to 5. Of the No. 1 north I have already spoken, and of the others, suffice it to say that No. 3 north is connected with the Protection Island workings. The air in the workings off the slope is brought from the downcast of No. 1 shaft, and returns up the No. 2 or upcast shaft. I noticed some very fine looking coal on the slope, and one's attention is at once directed to the uniform, hard texture, and cubical fracture of these huge specimens. It is true, hard, bituminous coal, without any bony or foreign matter to be seen. The depth of this slope is about a mile and a quarter.

I have now trespassed somewhat considerably upon Mr. McGregor's valuable time and so thanking him for his kind escort I ascend once more to the surface.

THE SOUTHFIELD MINE.

After taking in some of the remainder of the company's widespread undertakings in the suburbs, to describe which fully would require a volume, I note briefly that the No. 5 pit, already mentioned, is down 508 feet to a part of the Douglas seam, having the characteristics of what is known on the market as "Southfield coal"—a first class steaming and coking coal. The mine is worked on the same principle and by machinery and appliances similar to those of the No. 1 shaft, excepting the electricity. The fuel is in great demand—it is said to burn to the last particle, leaving no waste from dross or small coal. The railway connects with the esplanade shipping wharves, and is about six miles in length. The field of coal is very extensive and is now under development by diamond drilling machines. The company owns large areas of coal lands to the dip and southwards of the No. 1 and No. 5 shafts, which are now being thoroughly explored. Mr. Richard Gibson is overman.

The Protection Island shaft and its workings are in effect an expansion of the No. 1 Shaft mine. The workings have been carried far by two main slopes to northeast and eastward, each of them being upwards of a mile in the direction of Gabriola Island, where the company has a large field. The colliery plant on Protection Island is, with its engines, bunkers and wharves, etc., a model of successful mechanical application. The coal is similar to that raised in No. 1 shaft. The extent and limits of the field are in course of exploration, and the possibilities are very great. Mr. Thomas Morgan is overman.

THE NORTHFIELD COLLIERY.

The Northfield colliery is about four miles from Departure Bay. Here the seam is called "New Welington coal." The seam averages from three to five feet thick. The shaft is 400 feet in depth, and the length of the slope at the foot of the shaft is 1,000 yards. The system of working is that called the "Longwall," in which all the coal is extracted as mining proceeds. At the mine the machinery and plant are all first class. The pit is served by a railway of five miles, which terminates in a wharf of splendid construction at Departure Bay.

In all the mines of the company, naked lights are used in ordinary work, but the Firemen and Workmen's Committee of examination, of course use safety lamps. The "dip" of the seam or seams in the company's estate is from six to eight degrees. Coal washing machinery is constantly in operation, and utilizes all the small coal which is not consumed in the furnaces. There are about 1,500 men in the company's service.

Every precaution has been taken to guard against the spreading of fire in the works, and hydrants with lengths of hose are placed handily at convenient stations.

THE FARM.

The company's business embraces the disposition of their landed properties for actual settlement, and special inducements are afforded to those who desire to become *bona fide* occupiers, with liberal terms of lease or purchase. Notably, the system introduced by Mr. Robins, of the division of large areas, into five acre lots, which are let on lease with right of purchase, has been taken advantage largely of—by the workmen principally. The company has cleared, out of the forest, and bushy swamp or bottom lands about 500 acres in several tracts, and has followed up the clearance by thorough tile drainage and culture for production of grain, roots and hay, meadows having been also sown in grass. The "Farm," while productive of crops that ought to yield, if not instantly, in due course, a fair return, for the considerable necessary outlay involved in its establishment, serves also as a "model" for the instruction and encouragement of the many workmen who settle upon parcels of the company's estate.

The preliminary operations of clearing the thousands of sturdy giants of the woods, root and branch, with the smaller timber, bush, tangled undergrowth, ferns and all out of sight and mind, were of the greatest use as object lessons, and so with the drainage, classification and mixture or dressing of soils, comprising almost every kind—clay, peat, loam, gravelly loam, light sandy soil, and black vegetable soil. Under the direction of Mr. Robins dressings of the peaty soil from swampy low lands have been applied to the gravelly soil of which the up lands mostly consist with excellent effect, in fact, it acts like manure. On the other hand, a top dressing of gravelly soil, carted from the hill side, and spread over the peaty land, has an equally beneficial result. The explanation of this is, that mixing the inert peat soil, with the sand or gravel, makes an open soil, which allows access to the air, and so converts the dead chemical matter into plant food. In short, whilst the peat alone, and the gravel alone, will grow almost nothing, the two mixed together, produce abundant crops. The heaviest crop of timothy hay produced in the district was grown on soil that was little better than road metal (gravel), but had been top dressed with peat from a neighbouring swamp. The company has laid about sixty miles of drain tiles, from three inch to twelve inch diameter and has excavated several miles of open ditches throughout the farm and meadow lands.

In the matter of roads, both as to excellence of construction and finish--in most instances they are well crowned and coated with a thick layer of gravel, the company are accorded much praise by the occupiers of the five acre lots and also by the public at large—these efficient roads, on the whole, are quite twenty miles in length, and include substantial bridges over Chase River and other streams.

The farm and its divisions, the several paddocks of grass and hay lands, and other portions of the company's property, are well fenced with board fences, extending over fifteen miles in length. Gates for traffic, wickets and paths for pedestrians are provided, admitting of passage through all parts of the estate, besides lovers' walks and trails through the woodlands held in reserve around the town. The clearing and cultivating have not driven the chivalry and romance from Nanaimo. The clearing of land for the plough that was only covered by wild grasses, willow and small brush, has cost from $50 per acre, and where timber was large and growing thickly as much as $400 an acre.

Experience, so far, shows that in the heavy timbered land, such as is found at the back of Nanaimo, an inexpensive powder, if it could be produced (and an association of farmers could manufacture a suitable powder themselves) would reduce the cost of clearing by nearly one half.

About 500 acres of forest land has also been cleared by holders of five acre lots, and the same is built upon substantially—in many cases ornately—and under cultivation.

The head offices of the New Vancouver Coal Mining and Land Company are at 12 Old Jewry Chambers, Old Jewry, E.C., London, Eng.

John Rosenfeld's Sons are the agents of the company at San Francisco, California.

The story of the coal industry of Vancouver Island is not half told but our available space is exhausted. Further description of the collieries must perforce of circumstances, at present, to our regret, remain in abeyance for a future occasion.

In the meantime we wish them one and all success and prosperity in their efforts to raise the coal production of Vancouver Island to a position that will command the foreign markets of California, Central America, Mexico, Hawaii, Alaska and Japan.

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